MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

BFN3174 – FINANCIAL MODELLING

(All sections / Groups)

27 February 2017
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **EIGHT** pages (excluding this cover page).
2. Answer **ALL FOUR** questions in **FOUR SEPARATE** Excel spreadsheets in **ONE SINGLE** Excel file.
3. Your Excel file should be named with your **STUDENT ID**, followed by your **NAME**, for example: **1111111623_HISHAM.xls**
4. **SAVE** your answers for all questions in the provided **THUMB-DRIVE.**
5. Please also copy your answers together with formulas onto the **HARD COPIES** of Excel spreadsheet **ATTACHED** to this question paper.

QUESTION 1 (25 MARKS)

Today is your 22nd birthday. You expect to retire at age 65 and actuarial tables suggest that you will live to be 100. You want to move to Ipoh when you retire. You estimate that it will cost you RM50,000 to make the move (on your 65th birthday) and that your annual living expenses will be RM40,000 a year after that. You expect to earn an annual return of 6% on your savings. Please use the template provided below to carry out your modeling for the following questions:

a. How much will you need to have saved by your retirement date?

(8 marks)

b. You already have RM20,000 savings. How much would you need to save at the end of each year of the next 43 years to be able to afford this retirement plan?

(9 marks)

c. If you did not have any current savings and did not expect to be able to start saving money for the next 5 years (that is, your first savings payment will be made on your 27 birthday), how much would you have to set aside each year after that to be able to afford this retirement plan?

(8 marks)

	A	B	C	D
1	**INPUT ZONE**			
2	Annual return			
3	Cost of move			
4	Yearly cost			
5	Current Age			
6	Retirement Age			
7	Initial savings			
8				
9	**MODELING ZONE**			
10	**Answer for 1a:**			
11	**Year**	**Annual Withdrawal at the beginning a year**	**Present Value**	
12	65			
13	66			
14	67			
15	68			
16	69			
17	70			
18	71			
19	72			
20	73			
21	74			
22	75			
23	76			
24	77			
25	78			
26	79			
27	80			
28	81			
29	82			
30	83			
31	84			
32	85			
33	86			

Continued...

	A	B	C	D	E
32	85				
33	86				
34	87				
35	88				
36	89				
37	90				
38	91				
39	92				
40	93				
41	94				
42	95				
43	96				
44	97				
45	98				
46	99				
47	100				
48		Cost of Retirement at the age of 65		**(4 marks)**	
49					
50		PV of Cost of Retirement at the age of 22		**(4 marks)**	
51					
52	**Answer for 1b:**	Initial Saving		**(2 marks)**	
53		Balance		**(3 marks)**	
54					
55		Needed annual savings		**(4 marks)**	
56					
57	**Answer for 1c:**	PV of cost of retirement at age 27		**(4 marks)**	
58					
59		Needed annual savings		**(4 marks)**	
60					

QUESTION 2 (25 MARKS)

a. You are considering buying a property in Klang Valley. The property is selling for RM7,000,000, and you anticipate an annual free cash flow (FCF) of RM2,000,000. At the end of 10 years, the property will be half depreciated, and at this point you think you can sell the building for RM10,000,000. If your cost of capital is 10%, does the building have a positive net present value (NPV)? Assume a 20% capital gains tax on the sale of the building in 10 years, income taxes and depreciation tax shields have been included in the annual FCF of RM2,000,000. Using the template below to carry out your modeling.

(10 marks)

Continued...

	A	B	C	D	E	F
1	**INPUT ZONE**					
2	Cost (RM)					
3	Annual FCF (RM)					
4	Sale value at end of 10 years					
5	WACC					
6	Capital gains tax on sale of building					
7						
8	**MODELING ZONE**					
9	Residual from sale in 10 years					
10	Sale value (RM)		**(1 mark)**			
11	Book value (RM)		**(1 mark)**			
12	Capital gain (RM)		**(1 mark)**			
13	Taxes (RM)		**(1 mark)**			
14	Net from sale of building		**(1 mark)**			
15						
16	Year	Cash flow				
17	0					
18	1					
19	2					
20	3					
21	4					
22	5					
23	6					
24	7					
25	8					
26	9					
27	10		**(3 marks)**			
28						
29	NPV		**(2 marks)**			
30						

b. Pain de Malaysia (PDM) has just announced results that show that the free cash flow (FCF) for the past year is RM100 million. An experienced analyst believes that the growth rate of the FCF for the next 10 years will be 10% per year and that after 10 years the growth rate will be 8% annually. PDM's weighted average cost of capital (WACC) is 20%, and the company has 30 million shares outstanding. Value the shares assuming that the FCFs occur at year end. PDM has RM10 million debt and no excess cash reserves. If the FCFs occur mid-year, what would your answer be now? Using the following template to model the above questions.

(15 marks)

Continued...

	A	B	C	D
1	**INPUT ZONE**			
2	Base year FCF			
3	High growth rate, g_{high}			
4	Normal growth rate, g_{normal}			
5	Number of high growth years			
6	WACC			
7	Debt			
8	Cash			
9	Number of Shares			
10	**MODELING ZONE**			
11	Term 1 factor: $(1+g_{high})/(1+WACC)$			
12	Term 1: PV of high-growth cash flows		(2 marks)	
13	Term 2: PV of normal-growth cash flows		(2 marks)	
14	Enterprise value		(2 marks)	
15	Add cash		(1 mark)	
16	Subtract debt		(1 mark)	
17	Value of equity		(1 mark)	
18			(1 mark)	
19	Number of shares		(1 mark)	
20	Share value			
21				
22	**b.** If cash flows occur in mid-year, then:		(2 marks)	
23	Value of equity		(2 marks)	
24	Share value			
25				
26				

QUESTION 3 (25 MARKS)

A company is considering buying a new machine for one of its factories. The cost of the machine is RM300,000 and its expected life span is 5 years. The machine will save the cost of a worker estimated at RM100,000 annually. The book value of the machine at the end of the year 5 is RM30,000, but the company estimates that the market value will be RM50,000. Using the following excel template, model the net present value (NPV) of the machine if the discount rate is 12% and the tax rate is 30%. Assume straight-line depreciation over the 5-year life of the machine.

Continued...

	A	B	C	D
1	**INPUT ZONE**			
2	Machine cost			
3	Machine book value, year 5			
4	Annual depreciation			
5	Annual cost savings, before tax			
6	Tax rate			
7	Discount rate			
8	Salvage value			
9				
10	**MODELLING ZONE**			
11	Salvage value, year 5		(2 marks)	
12	Machine Book value after 5 years		(2 marks)	
13	Taxable gain		(2 marks)	
14	Tax shield		(2 marks)	
15	Cash flow from salvage value		(2 marks)	
16				
17	Annual cost saving		(2 marks)	
18	Tax		(2 marks)	
19	Annual cost saving after tax		(2 marks)	
20	add back depreciation		(2 marks)	
21	taxable income		(2 marks)	
22				
23	**Year**	**Cash Flows**		
24	0			
25	1			
26	2			
27	3			
28	4			
29	5			
30				
31	NPV		(5 marks)	
32				

QUESTION 4 (25 MARKS)

a. Using the Black-Scholes model, model the price of a put option on a stock with the template provided below. Please use both put-call parity and direct formula to model the put option. Details of the stock are:

- Current price (S) = 30
- Exercise price (X) = 25
- Time to maturity (T) = 0.75
- Interest rate (r) = 0.03
- Standard deviation (sigma) = 40%.

(10 marks)

Continued...

b. Using the following templates to produce data tables and graphs that show:

(i) the sensitivity of the Black-Scholes put price to changes in the initial stock price (S). **(5 marks)**

(ii) the sensitivity of the Black-Scholes put price to changes in the volatility to maturity (T). **(5 marks)**

(iii) the sensitivity of the Black-Scholes put price to changes in the interest rate (r). **(5 marks)**

	A	B	D
1	**Input Zone**		
2	S		
3	K		
4	r		
5	T		
6	Sigma		
7			
8	**Modelling Zone**		
9	Step 1:		
10	d_1		1 mark
11	d_2		1 mark
12			
13	Step 2:		
14	$N(d_1)$		2 marks
15	$N(d_2)$		2 marks
16	N(-d1)		1 mark
17	N(-d2)		1 mark
18			
19	Step 3:		
20			
21	Put price		2 marks

Continued...

	A	C
25		
26	**Sensitivity Analysis for the Call and Put Option Prices due to changes in the Stock Price**	
27		
28	**Stock Price**	**Put Option Price**
29		0.00
30	1	
31	2	
32	3	
33	4	
34	5	
35	6	
36	7	
37	8	
38	9	
39	10	
40	11	
41	12	
42	13	
43	14	
44	15	
45	16	

	A	C
103		
104	**Interest rate**	**Put Option Price**
105		0.00
106	0.01	
107	0.02	
108	0.03	
109	0.04	
110	0.05	
111	0.06	
112	0.07	
113	0.08	
114	0.09	
115	0.10	
116	0.11	
117	0.12	
118	0.13	
119	0.14	
120	0.15	
121	0.16	
122	0.17	
123	0.18	
124	0.19	
125	0.20	
126		

Continued...

	A	C
130	**Time to Maturity**	**Put Option Price**
131		0.00
132	0.05	
133	0.10	
134	0.15	
135	0.20	
136	0.25	
137	0.30	
138	0.35	
139	0.40	
140	0.45	
141	0.50	
142	0.55	
143	0.60	
144	0.65	
145	0.70	
146	0.75	
147	0.80	
148	0.85	
149	0.90	
150	0.95	
151	1.00	

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